

Proposed Diesel Risk Reduction Plan



**Board Meeting
September 28, 2000**



California Environmental Protection Agency
Air Resources Board

Multi-Divisional Effort

■ Primary Authors

- ◆ Stationary Source Division
- ◆ Mobile Source Control Division

■ Contributors

- ◆ Planning and Technical Support Division
- ◆ Research Division

Overview

- Background
- Emissions
- Risk
- Control Options
- Proposed Measures
- Benefits
- Issues
- Summary and Recommendation



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Summary of Risk Reduction Plan

- Comprehensive plan
- Commitment for action over the next 5 to 7 years
- Considers all uses of diesel engines
 - ◆ mobile, stationary, portable
- Recommends 14 new control measures
- Recommends controls on new and existing engines and vehicles

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Summary of Risk Reduction Plan

(Continued)

- Recommends fuel reformulation to very low-sulfur content (15 ppm) for on- and off-road mobile, and stationary engines
- Reduces current emissions and potential risks by 75% in 2010 and by 85% in 2020

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Background

Identification of Diesel PM

- August 1998 Board listed “Particulate Matter Emissions from Diesel-Fueled Engines” as a Toxic Air Contaminant
- Directed staff to begin risk management process



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Advisory Committee and Subcommittees

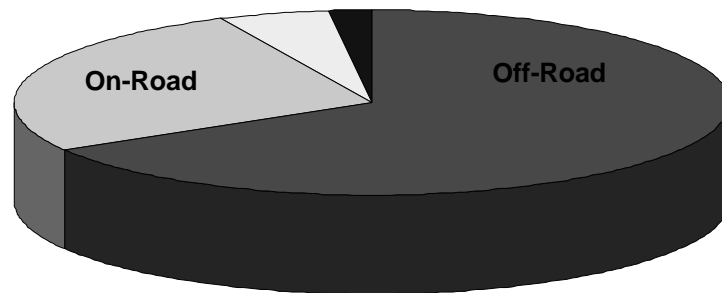
- Advisory Committee and four subcommittees established in 1998
- Subcommittees include representatives from ARB, U.S. EPA, state and local agencies, industry, environmental groups, and interested public
- Subcommittees have met many times
- Staff has met with individual stakeholders



There are 1.25 Million Diesel Engines in California

- Mobile
 - ◆ on-road - 687,000
 - ◆ off-road - 547,000
 - ✦ includes portable equipment - 49,000
- Stationary
 - ◆ emergency/standby - 11,000
 - ◆ prime - 5,000

93% of Diesel PM is Emitted by Mobile Sources

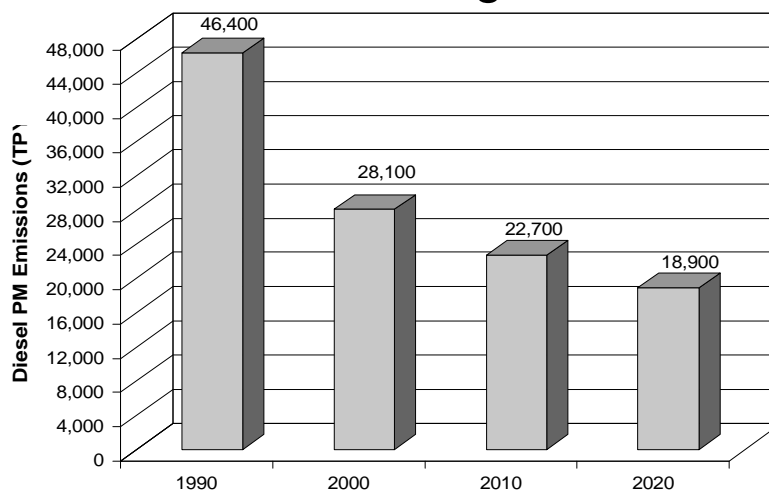


Year 2000

■ Off-Road (66%)	■ On-Road (27%)
□ Portable (5%)	■ Stationary (2%)

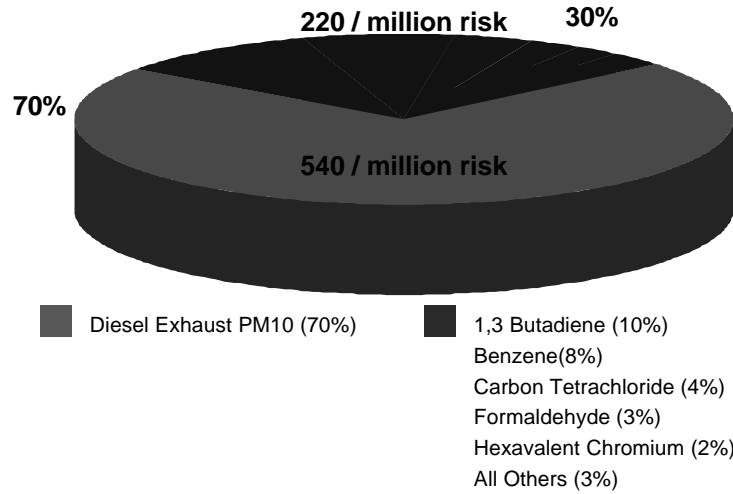
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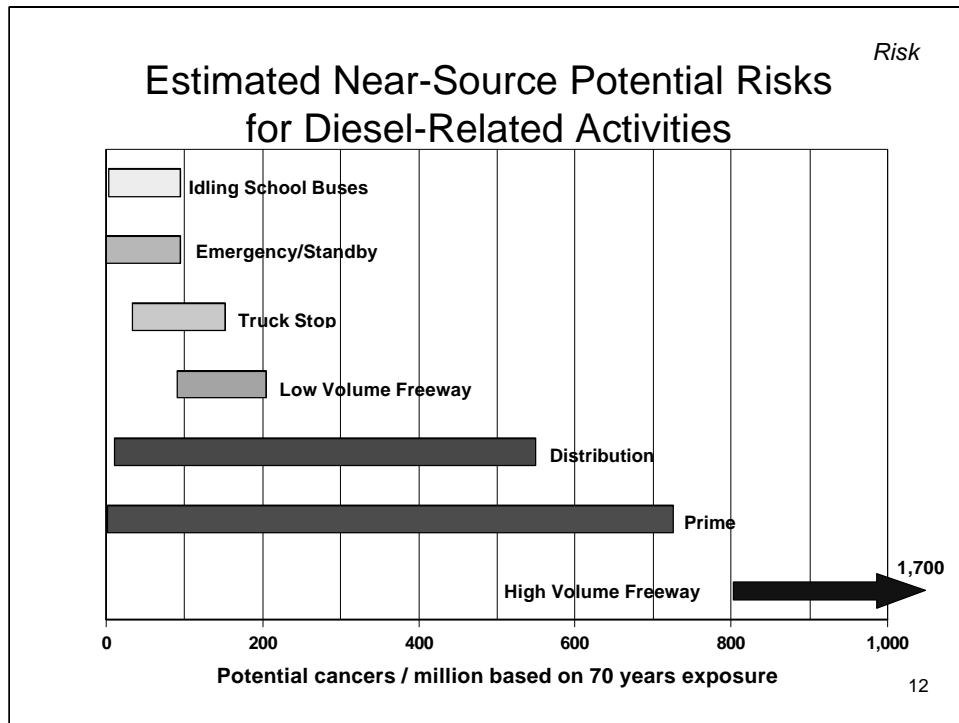
Diesel PM Emissions Trend Under Current Program



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Diesel PM Responsible for 70% of Year 2000 Statewide Risk from Air Toxics Emissions





The estimated risk presented in the figure above, and the assumptions used to determine these risks, are not based on a specific source of diesel PM. Instead, general assumptions bracketing a fairly broad range of possible operating scenarios were used. The estimated risks are based on the diesel PM concentration at the point of maximum impact as determined using air dispersion modeling. The estimated risk ranges are used to provide a "qualitative" assessment of potential risk levels near sources of diesel PM. These estimates are based on the risk assessment methodology and assumptions identified in Appendix 7 of the Proposed Diesel Risk Reduction Plan, September 13, 2000. Actual risk levels from these types of sources at any individual site will vary due to site specific parameters, including equipment technologies and emission rates, fuel properties, operating schedules, meteorology, and the actual location of off-site receptors.

Reductions Needed

- Existing regulations have significantly reduced PM emissions from diesel-fueled engines, but more reductions are needed
- Diesel-fueled engines are the most significant source of air toxics in California
- Need to examine all categories and uses of diesel-fueled engines

Goals of Diesel PM Risk Reduction Plan

- Reduce emissions from new mobile, portable, and stationary engines
- Reduce emissions from existing mobile, portable, and stationary engines (retrofit)

Options to Further Reduce Diesel PM Emissions

- Catalyst-based DPF (traps)
- Alternative technology
- Alternative fuels

Catalyst-Based Diesel PM Traps

- Can reduce diesel PM and hydrocarbon emissions by 90% or more
- More than 40,000 successful applications of diesel PM traps
- Diesel PM traps have been in use for the past 14 years
- Traps the PM and allows it to completely burn off

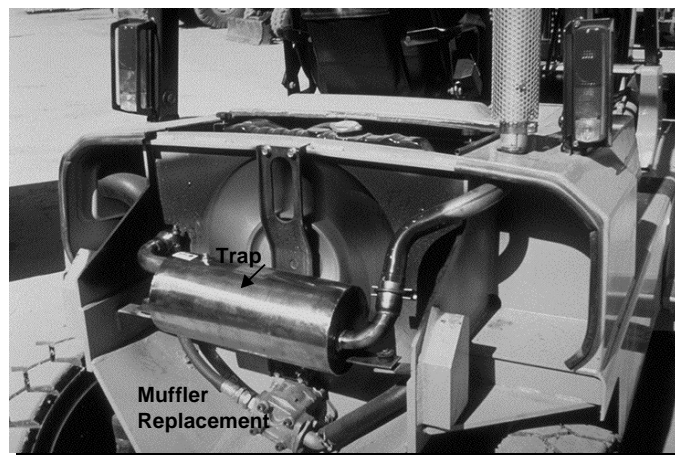
Diesel PM Traps Are Effective

- Can be applied to new engines
- Can be retrofitted to existing engines



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Diesel PM Trap Applications Fork Lift



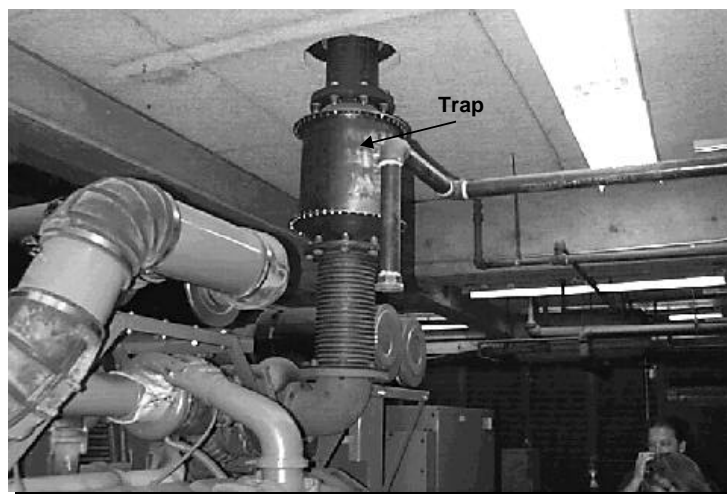
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Diesel PM Trap Applications School Bus



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Diesel PM Trap Applications Stationary Engine



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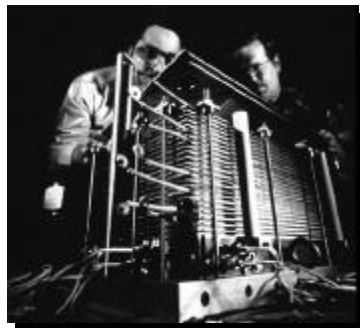
Trap Requirements

- Exhaust temperature must be sufficient to clean the trap
- Very low-sulfur diesel fuel (15 ppm) needed for best performance

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Other Control Options

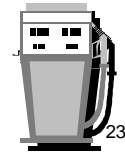
- Alternative technologies
 - ◆ electrification
 - ◆ fuel cells
- Alternative fuels
 - ◆ CNG, LNG, LPG, dual-fuel
- Alternative diesel formulations/additives
- Engine modifications



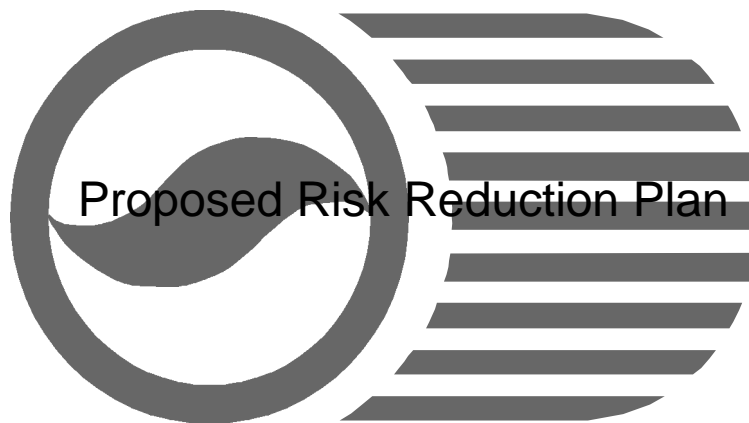
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Staff Proposes Development of 14 New Measures Over the Next 2-3 Years

- Mobile on-road and off-road engines
- Stationary and portable engines
- Fuel requirements
- Federal action for some categories



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Four On-Road Mobile Source Measures Proposed

- Lower new engine standards (2001)
- Retrofit existing engines (2002)
- Control of HDV in-use emissions (2003)
- Supplemental test procedures HDV certification (2000)
- Implementation between 2002-2008



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Four Off-Road Mobile Source Measures Proposed

- Lower new engine standards (2002)
- Retrofit existing engines (2002)
- Standards for diesel pleasure craft (2002)
- Control of in-use emissions (2003)
- Implementation between 2002-2008



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Five Measures Addressing Stationary and Portable Engines

- Address both new and existing engines
- Address emergency/standby, prime, agricultural, and portable engines
- Adoption 2002
- Implementation between 2002-2005



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Fuel Measure

- Very low-sulfur CARB diesel (15 ppm) for on- and off-road, portable, and stationary engines (2001)
- Implementation by 2006
- Provide for early introduction of very low-sulfur CARB diesel for selected applications

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Guidance Document Addressing Alternative “Diesel” Fuel and Fuel Additives (2001)

- Identify alternatives, emission reduction potential, and costs
- Alternative “diesel” fuels include:
 - ◆ bio-diesel
 - ◆ diesel/water mixtures
- Additives

Federal Action Is Critical

- Locomotives
- Commercial marine vessels
- New farm and construction equipment <175 hp
- New vehicle standards and fuel specifications





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Benefits

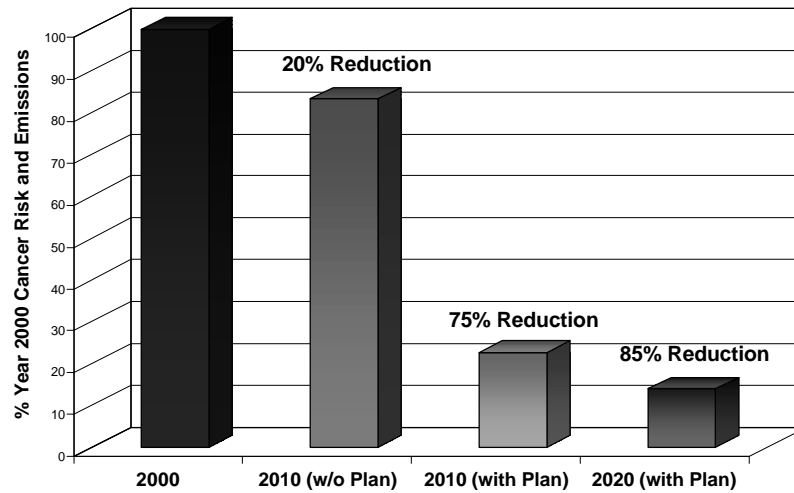
The Proposed Plan

- Proposed plan would significantly reduce diesel PM emissions and potential cancer risks
- Other benefits would include
 - ◆ improved visibility
 - ◆ reduced “soiling”
 - ◆ decrease in noncancer health effects



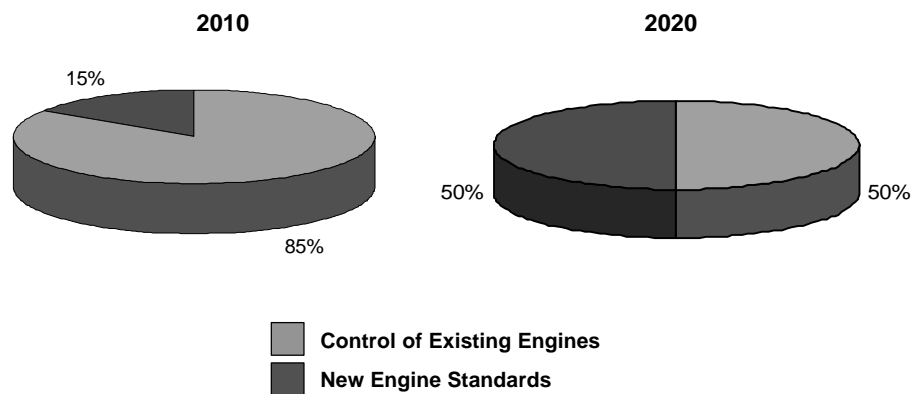
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Proposed Plan Reduces Diesel PM Emissions and Risk by 75% in 2010 and by 85% in 2020



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Retrofit of Existing Engines Is Necessary to Achieve Plan's Goals



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Cost of Plan

- Anticipated cost of Plan is significant
- Comparable to other major ARB programs
- Detailed cost analysis as measures are developed
- Staff intends to investigate economic incentives

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Issues

Issues

- Control technology
 - ◆ cost
 - ◆ effectiveness for certain categories of engines
 - ✦ durability
 - ✦ exhaust temperature
- Alternative technologies/fuels

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Summary

- Plan is a commitment for action
- Considers all uses of diesel-fueled engines
 - ◆ mobile, stationary, portable
- Identifies program goal
- Recommends 14 new measures
- Details to be developed during regulatory process

Summary

(Continued)

- Addresses new and existing engines
- Recommends fuel reformulation to very low-sulfur content (≤ 15 ppm)
- Provides for alternatives
- Reduces emissions and potential cancer risk by 75% in 2010 and by 85% in 2020

Recommendations

- Approve the Proposed Diesel Risk Reduction Plan
- Direct staff to expeditiously implement the Plan

